

## REMARKS

Please charge any required fees to have this amendment entered to our deposit account No. 500687.

Reconsideration and allowance of the subject application are respectfully requested.

Claims 15-17, 24, 36, 39-43 and 48-57 are pending in the application. All cancelled claims have been cancelled without prejudice. Applicant reserves the right to pursue the subject matter of withdrawn claims 44-47 in a divisional application. Basis for the amendment to claim 1 can be found at cancelled claims 21 and 33 and at page 2, line 23 of the present application. Basis for new claims 48-56 can be found in the originally filed application including as follows:

claim 48 at pending claims 15, 16, 17, 21, and 33, and at pages 2, lines 7-8 and 16-17;

claims 49-51, 55 and 56 at page 4, lines 1-5;

claim 52 at page 4, lines 16-17;

claims 53 and 57 at page 2, lines 30-31; and

claim 54 at pending claims 15, 16, 17, 21, 33, and 43, and at pages 2, lines 7-8 and 16-17, and page 3, line 24 through page 4, line 22. No new matter has been added.

The rejection of claim 43 under 35 U.S.C. § 112, second paragraph, is obviated by the amendment to claim 43 set forth above. Accordingly, withdrawal of the Section 112 rejection is respectfully requested.

The rejection of claims 15, 18 and 27 under 35 U.S.C. § 102(b) as being unpatentable over GB 881813 (D1) is obviated by the amendment to claim 15 set forth above. Accordingly, withdrawal of the Section 102 rejection is respectfully requested.

The rejection of claims 16, 17, 19-26 and 28-43 under 35 U.S.C. 103(a) as being unpatentable over D1 alone, or in combination with any of U.S. Patent No. 2,309,168 (Corson, D2), U.S. Patent No. 5,903,591 (Brassy), U.S. Patent No. 1,890,202 (Tinker), U.S. Patent No. 5,792,440 (Huege), and/or U.S. Patent No. 5,173,279 (Dumont), is respectfully traversed. The claimed invention is not taught or suggest by any combination of the cited references.

A purpose of the present invention is to provide a method for hydration of particulate or pulverulent material containing CaO, wherein the material particles do not lump into agglomerates. Another purpose of the present invention is to confine the hydration mainly to the active surface of the material particles.

Amended claim 15 and dependent claims 16, 17, 24, 36 and 39-43 recite that:

1. the hydration process takes place **in an atmosphere containing the maximum amount of water vapour**,
2. the temperature during the hydration process is maintained at a level **above 200 °C**, and
3. the partial pressure of the water vapour is maintained within the interval **0.9 to 1.1 atm**.

New claims 48-56 all recite that:

1. the temperature during the hydration process is maintained at a level **above 200 °C**, and
2. the partial pressure of the water vapour is maintained within the interval **0.9 to 1.1 atm**.

All of the prior art rejections are based on D1. D1 teaches in a direction opposite the claimed invention and, thus, all of the prior art rejections based on D1 should be withdrawn for this reason alone.

D1 teaches to avoid high concentrations of water, which is contrary to the claimed invention. See page 1, lines 35-50, which teaches: "a gaseous medium but **not saturated therewith**" and "Preferably the total amount of water required to react completely with a given mass of oxide is controlled and distributed instantaneously throughout the mass of the particles, in order to avoid any possible reaction of the particles with local and transient concentrations of water which are too high to permit organisation of the molecular of the hydroxide instantaneously produced into the pre-existing crystalline structure."

D1 teaches the water vapour pressure in the gaseous medium preferably is in the range of about 60 to 100 mm of Hg (about 0.08–0.13 atm). See page 1, lines 71–74. Example I in D1, which relates to hydration of CaO, used a water vapour

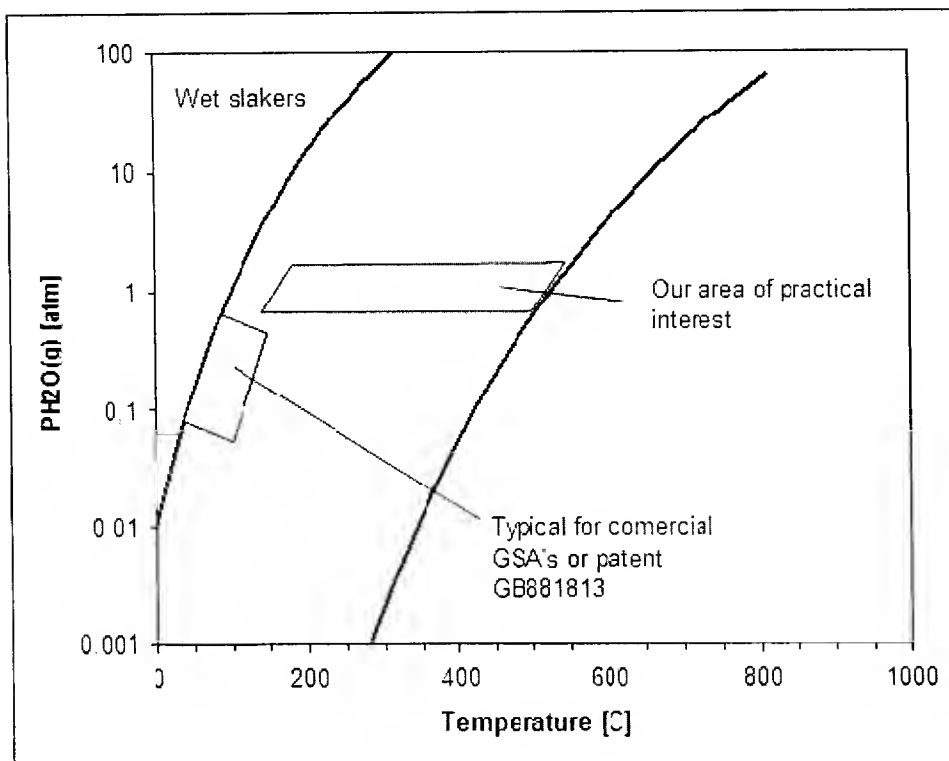
pressure of 100 mm of Hg. Even though Example II of D1 used a water vapour pressure of 600 mm of Hg (0.78 atm), this was for hydrating MgO. In contrast, all of the pending claims recite that the lower limit a water vapour pressure is 0.9 atm, which is more than six times the maximum for hydrating CaO disclosed in D1.

The amount of water vapour used in D1 cannot expanded upward to reach far greater amount of water vapour used in the claimed since the D1 clearly teaches to use lower amounts of water ("avoid saturation") to avoid the possible reactions discussed in the preceding paragraph. For this reason alone, all of the Section 103 rejections based on D1 should be withdrawn.

D1 also teaches that the total gas flux is heated to a temperature sufficient to ensure that it is **not** saturated with water at any point. See page 1, lines 74–76. The highest temperature mentioned for the fluidized bed is 120–125 °C, which corresponded to a temperature of the **saturator** of 41–42 °C (where the hydration occurs). See page 2, lines 103–106 of D1.

In contrast, all of the pending claim recite a minimum temperature of 200 °C, which is about 4 times higher than the highest temperature disclosed in D1 for the saturator. For this reason alone, all of the Section 103 rejections based on D1 should be withdrawn.

From the diagram below these differences become more clear:



Claims 39-41 and 48-56 are also not obvious over the cited references for the following reasons. All of these claims recite that the particles comprising  $\text{Ca(OH)}_2$  have a greater concentration of  $\text{Ca(OH)}_2$  on the surface than the inside. Different concentrations of  $\text{Ca(OH)}_2$  throughout the particles are possible in the claimed method since the reaction is between the particles containing  $\text{CaO}$  and water vapor at high vapor pressures (0.9 to 1.1 atm.), temperatures above 200 °C, and the retention time between the water vapour and  $\text{CaO}$  is short (fast reaction), i.e. while the particles are dropping through a vertical reactor. See page 4, lines 3-5 of the present application which discloses using a smaller vertical reactor to shorten the retention time between the  $\text{CaO}$  and the water vapour. See also page 3, last paragraph in the present application which discloses the advantages of having a greater concentration of  $\text{Ca(OH)}_2$  on the surface of the particles.

In contrast, D1 does not teach particles having a higher concentration of  $\text{Ca(OH)}_2$  on the surface. The particles of D1 consist entirely of  $\text{Ca(OH)}_2$  since the "reaction is sufficiently slow." See page 1, line 28. In the examples I and II, the retention times between the  $\text{CaO}$  and water vapour were 105 minutes (page 2, line 28) and 2 hours (page 3, line 88). The very long retention times (slow reaction) in D1 are magnitudes of order longer than the very short retention time the claimed

particles drop through the hydration site in the vertical reactor. These "slow" reactions in D1 cannot be modified to provide the far faster reaction times of the claimed invention without destroying the main teachings of D1. For this reason alone, all of the Section 103 rejections based on D1 should be withdrawn.

The claimed invention solves the problem of agglomeration. See page 1-2 of the present application. The claimed invention forms particles comprising  $\text{Ca}(\text{OH})_2$  which are substantially free of agglomerates so that no grinding is necessary before use in reducing  $\text{SO}_2$  discharges. None of the cited references address this problem. In fact, D1 teaches in a direction away from the claimed invention. Thus, the combination of D1 with any of the secondary references must also teach away from the claimed invention.

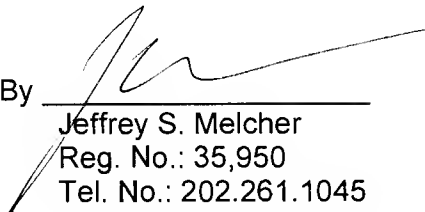
None of the secondary references solve the deficiencies of D1, nor can they. The opposed teachings in D1 discussed above cannot be ignored or modified by the secondary references. For example, the vertical reactors disclosed in the secondary references, D2 and Brassey, cannot be used to practice the method of D1 as alleged by the Examiner. As discussed above, D1 requires a "slow" reaction, over an hour. If the vertical reactors of D2 and Brassey were modified to hydrate  $\text{CaO}$  particles as they drop therethrough, the dropping particles could not be falling through the hydration zone for over any hour to provide the "slow" reaction of D1. Thus, the vertical reactors of D2 and Brassey cannot possibly be used to practice the slow reaction method of D1. For this reason alone, the Section 103 rejections should be withdrawn.

In view of the many differences between the claimed invention and the theoretical combinations of the cited references, the opposed teachings in the primary reference D1, and the unexpected advantages of the claimed invention, withdrawal of the Section 103 rejections are respectfully requested.

In view of all of the rejections of record having been addressed, Applicant submits that the present application is in condition for allowance and Notice to that effect is respectfully requested.

Respectfully submitted,  
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